



APPRAISAL BULLETIN

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ESTIMATING LIVABLE SPACE AND CUBIC CONTENT

SINCE last month's bulletin was devoted to discussing the methods whereby the cubic content of a building should be found, it will probably be well to consider a uniform method for calculating the square foot area. We believe that the square foot method of estimating reproduction costs is not so accurate as the cubic content method, and recommend that it be used primarily for quick figuring or as a check on the estimate obtained by using the cubic content method.

The following paragraph is from the FHA's Underwriting Manual, and contains a very good summation of a uniform method of calculating the square foot area of a building:

Calculation of Square Foot Area. The square foot area (of livable space*) of building improvements shall be computed as follows:

(1) To be included and calculated in full:

The finished and livable floor area above the basement, including bays, oriels, dormers, light shafts, exterior chimneys, enclosed porches, and built-in garages. In computing these areas, measurements shall be taken to the outside surfaces of the exterior walls or partitions enclosing the areas.

(2) To be included and calculated in part:

(a) Finished livable area of basement, such as a recreation room, or servants' quarters, measured to the outside of exterior walls or partitions 1/2 area

(b) Semi-finished area of attic, not used as a livable area measured to the outside of exterior walls or partitions 1/2 area

(c) Non-enclosed porches:

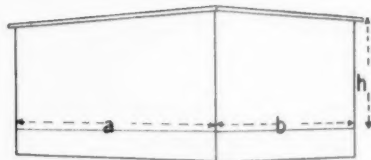
1. Within house proper 2/3 area
2. As an extension to house 1/2 area

* Parenthetical phrase inserted by us.

(cont. on page 272)

BASIC SHAPES OF RESIDENTIAL BUILDINGS

I



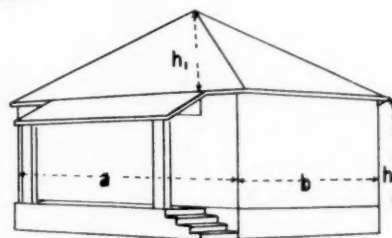
Volume = base x height

Base = $a \times b$

Height = h

Volume = $a \times b \times h$

II



Volume = base x height of 1st story + pyramid-shaped roof

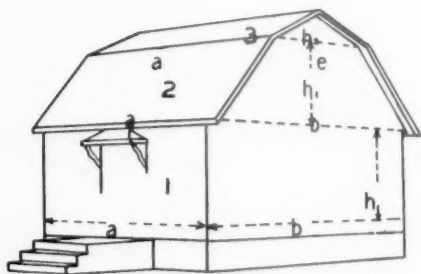
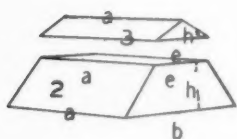
Base = $a \times b$

Height of 1st story = h

Height of roof = h_1 (perpendicular distance from peak to ceiling joists)

$V = a \times b \times h + a \times b \times \frac{h_1}{3}$

III



Volume = 1 + 2 + 3

Volume of 1 = $a \times b \times h$

Volume of 2 = $\left(\frac{e+b}{2}\right) \times h_1 \times a$

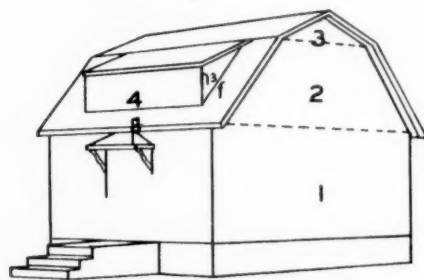
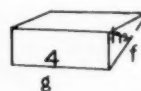
Volume of 3 = $a \times e \times \frac{h_2}{2}$

e = length across gable at roof angle

h_2 = height of triangular portion of gable

h_1 = height of trapezoidal portion of gable

IV



Volume = 1 + 2 + 3 + 4

Volume of 1 + 2 + 3 same as diagram III

Volume of 4 = $f \times \frac{h_3}{2} \times g$

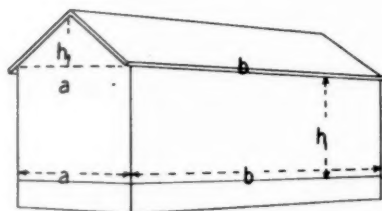
g = length of dormer

f = length of base of triangular end

h_3 = perpendicular height of triangular end

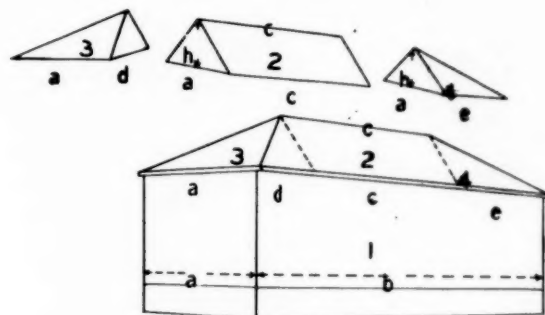
BASIC SHAPES OF RESIDENTIAL BUILDINGS

V



$$\text{Volume} = a \times b \times h + a \times b \times \frac{h_1}{2}$$

VI



$$\text{Volume} = 1 + 2 + 3 + 4$$

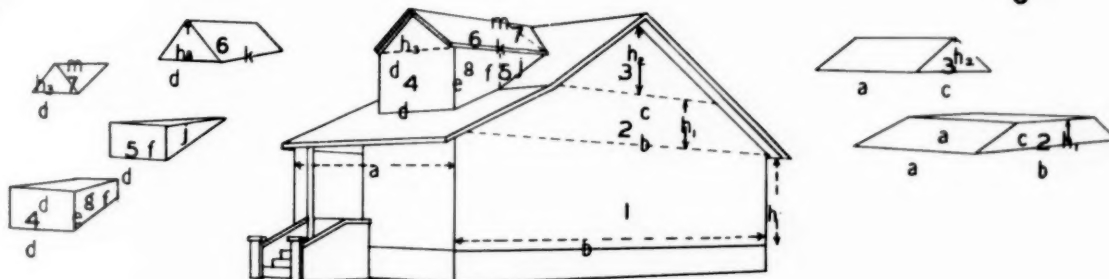
$$\text{Volume of 1} = a \times b \times h$$

$$\text{Volume of 2} = a \times c \times \frac{h_1}{2}$$

$$\text{Volume of 3} = a \times d \times \frac{h_1}{3}$$

$$\text{Volume of 4} = a \times e \times \frac{h_1}{3}$$

VII



$$\text{Volume} = 1 + 2 + 3 + 4 + 5 + 6 + 7$$

$$\text{Volume of 1} = a \times b (- \text{porch area}) \times h$$

$$\text{Volume of 2} = \frac{c + b}{2} \times h_1 \times a$$

$$\text{Volume of 3} = a \times c \times \frac{h_2}{2}$$

$$\text{Volume of 4} = \frac{e + f}{2} \times g \times d$$

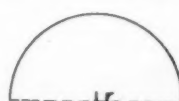
$$\text{Volume of 5} = d \times f \times \frac{j}{2}$$

$$\text{Volume of 6} = d \times k \times \frac{h_3}{2} \quad (k = g + j)$$

$$\text{Volume of 7} = d \times \frac{h_3}{2} \times \frac{m}{3}$$

MISCELLANEOUS SHAPES FOUND LESS FREQUENTLY

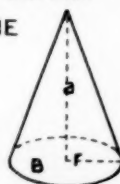
HEMISPHERE (DOME)



$$V = \frac{2\pi r^3}{3}$$

$r = \text{radius}$
 $\pi = 3.1416 \text{ or } 22/7$

CONE



$$V = B \times \frac{a}{3}$$

$B = \pi r^2$
 $r = \text{radius}$
 $a = \text{altitude}$
 $\pi = 3.1416 \text{ or } 22/7$

CYLINDER



$$V = B \times a$$

$B = \pi r^2$
 $r = \text{radius}$
 $a = \text{altitude}$
 $\pi = 3.1416 \text{ or } 22/7$

(cont. from page 269)

(d) Masonry terraces supported on foundation
walls 1/4 area

(3) Not to be included:
Outside steps, cornices, parapets, and footings.

We are in disagreement with section (c) 2. and section (d) of the above paragraph.

We believe that non-enclosed porches or screened porches and masonry terraces should be figured separately and should not be included in the square foot calculations of the house proper. Our method of arriving at reproduction costs is to use the cubic cost method on the house and to add the costs of unenclosed or screened porches, slabs, walks, drives, fences, and other minor improvements. If the garage is separate from the house, we figure its cost separately, using the cubic cost method. On the porches, slabs, terraces, walks and drives we use the square foot method and on fences and walls we estimate cost by the number of lineal feet.

When estimating the cubic content of a building, appraisers are frequently confronted with buildings having irregularly or unusually shaped portions. On pages 270 and 271 we show several types of houses containing various geometric shapes and the recommended way of figuring the volume of these shapes separately.

The cubic contents of the basements in these houses are all figured the same - the area of the basement x the basement height; therefore the basements have been left out of the diagrams. It should be remembered that basement volume is calculated by using the distance between the outside wall areas and the distance from the bottom of the first floor joists to a point six inches below the finished surface of the basement floor.